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ABSTRACT

In 1996, the Tennessee Department of Education collaborated with Appalachia Educational Laboratory to conduct research on the use of the Internet as a tool for instruction in Tennessee K-12 schools, focusing on ways in which experienced teachers use the Internet to enhance students' intellectual development. This study explored the following questions: Can the Internet become a part of meaningful instruction? What sorts of professional development activities support use of the Internet as a part of meaningful instruction? and, under what conditions may the Internet be an effective tool for improving student achievement? The metnodology was organized around three integrated phases--planning, site-based observations and interviews, and analysis. Participants consisted of eight elementary school teachers in different geographical regions of Tennessee. Findings were analyzed related to three dimensions of Internet use: (1) resource acquisition, including accessing timely information and facilitating authentic learning tasks; (2) social interaction, including making connections with the world, learning through extended information networks, and interacting with local communities; and (3) intellectual inquiry, including improving student language/writing skills, energizing student learning, encouraging exploration, and promoting active learning. Teacher needs for effective Internet-based instruction were also examined, including improved Internet access, professional development, and appropriate assessment of engaged learning. The survey materials are appended. (AEF)

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Internet: Act 1 - Scenes from Tennessee Classrooms

Paper presented at the Annual Meeting of the American Educational Research Association
San Diego, California
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INTERNET: ACT I - SCENES FROM TENNESSEE CLASSROOMS

Instructional uses of telecommunications has emerged as an area for intense research and development. Educators widely expect that the Internet will contribute a great deal to educational improvement (Honey & Henriquez, 1993), but clear and compelling evidence does not yet exist. Internet access has became more prevalent in schools, access has increased from 35 percent in the fall of 1994 to 78 percent in the fall of 1997, and it is projected that by the year 2000, 95 percent of schools will have Internet access (U.S. Department of Education). Even though there is Internet access in more schools and access continues to grow, Internet use in U.S. classrooms is still meager (Cuban, 1993; Carpenter, Farris, Heavisise, & Malitz, 1995) and there are substantial barriers to Internet use (Honey & McMillan, 1993). Having Internet services within a school does not necessarily benefit the students or curriculum due to the obstacles that exist. There is little known about teachers' receptivity to the instructional use of the Internet (Howley & Howley, 1993). Further, little systematic knowledge exists about how the Internet can contribute to effective instruction (Rothenberg, 1994). Connections between Internet use and student achievement are unclear (Hunter, 1994) due to the limited research that is available that describes the impact of instructional use of the Internet on students' active learning. Lack of such understandings thus poses a dilemma for educators and others who recognize the importance of using technological innovations to give today's students the skills they will need tomorrow. Due to the vision of "Taking Tennessee to the Top Together through 21st Century Technology,"Tennessee is one of the states in which Internet access is growing rapidly.

In 1996 the state launched a plan to invest $100 million in cutting-edge equipment, training, and software for schools and classrooms. The ConnecTEN (TEN stands for Tennessee Education network) project's aim was to provide Internet connections with full graphics, text, and video in every one of Tennessee's 1,554 public schools by the fall of 1996. Through the ConnecTEN Internet project, Tennessee hopes "to enhance the teaching and learning process in classrooms." In 1996 the Tennessee Department of Education collaborated with Appalachia Educational Laboratory, Inc. (AEL) to conduct research on the use of Internet as a tool for instruction in K-12 schools. Previous accounts suggested that particular programs and teachers in the state were using the Internet successfully, but the educational potential of the Internet in typical classrooms had not been thoroughly explored. As of 1997, 89 percent of schools in Tennessee have access to the Internet, but only 18% of teachers have had any formal training on Internet use. (Kids Count).

The purpose of this effort was to investigate whether the Internet was being used by early adopters as a meaningful part of instructional practice. The project's goal was to identify ways in which experienced teachers use the Internet in Tennessee as a tool to enhance students' intellectual development.

Objectives

The problem set defining this project occupies the intersection of educational technology, professional development, routine instructional practice, and authentic educational aims. The reality presented is both complex and, as far as Internet use is concerned, little explored. Questions and issues considered for this project concern how teachers make the Internet a routine tool of meaningful instruction in classrooms. Anecdotal and testimonial accounts suggest that particular programs or teachers have used telecommunications successfully, and their students clearly enjoy the adventure. However, unanswered questions are numerous and important. This study explores these questions:

- Can the Internet become a part of meaningful instruction?
- What sorts of professional development activities support use of the Internet as a part of meaningful instruction?
- Under what conditions may the Internet be an effective tool for improving student achievement?

Theoretical Framework

Our theoretical approach to this project consists of two sets of assumptions. The first set concerns the nature of effective instruction and its connections to demonstrable student achievement. Drawing upon sources that include Brown, 1991; Campoy, 1992; Ertmer, & Newby, 1993; Howley, Howley, & Pendarvis, 1995; Levin, 1993; and Prather, 1993, we assert:

> *A goal of formal instruction is to promote intellectual development, an active process in which students arrive at understandings and make meanings; teachers must themselves value meanings and understandings in order to nurture intellectual development among students; and, finally, all this effort yields demonstrable results.*

This first set of theoretical assumptions, for which there is a considerable research base, provides a guide for construction of our second set of assumptions. This set entails a sober view of technology, grounded in the recognition that mass education (e g., on the factory model) comes to us with a long history of technology. Critics of the factory model remind us that technology can as easily create as solve a problem (e.g., Cuban, 1993; Postman, 1992). Our second set of assumptions are grounded in our view of the Internet as a tool for facilitating the mutual work of teachers and students as they develop the meanings and understandings that will produce demonstrable achievement.

The Internet as a tool for resource acquisition, social interaction, and inquiry. These uses constitute three dimensions of an Internet presence in the classrooms; they parallel the material, social, and intellectual structures that already characterize classroom culture. Hypothetically, Internet accessibility could enhance that structure in

typical classrooms. The potential for good may rest on the bridge-like quality of Internet connectivity. Acquiring resources from distant locations can provide a geographic bridge; telecommunications with other organizations and individuals around the world can provide a cultural bridge; and as a tool of inquiry, the Internet can serve as a temporal bridge.

These assumptions about instruction and the dimensions of Internet use in classrooms inform the goals and activities that follow. We believe that use of the Internet is not necessarily superior to the use of books or other intellectual resources in the classroom. It seems, however, to offer features and opportunities that might enhance the material, social, and intellectual structures of classroom life sufficiently to increase students' intellectual development.

Methodology

To investigate the potential and possibilities of the Internet as a meaningful part of instructional practice, we chose a descriptive approach using actual classroom observations and on-site interviews. Descriptive, site-based research provides detailed, realistic, and live data to answer research questions, such as those in this study. Our methodology, best described as meta-ethnography, was organized around three integrated phases: Planning, Site-Based Observations and Interviews, and Analysis.

Planning

Detailed planning and preparation were necessary for developing research sites and for recruiting and training field researchers. Planning and preparations by AEL staff were conducted from January to October 1996.

Developing research sites. A primary concern in determining research sites was to ensure that classroom teacher participants were not only experienced users of technology but also master teachers; furthermore, their use of the Internet needed to include a range of practices going beyond resource acquisition. Our selection process included several steps. First, we obtained names of award winning teachers and teachers with electronic-mail accounts. In addition, we solicited participation from teachers who had presented at the 1996 Tennessee Education Technology Conference. We also received informal recommendations from a number of sources. From this pool, we identified 350 teachers from around the state.

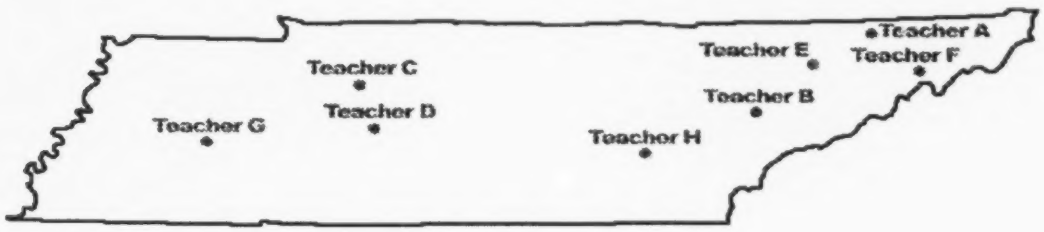
Next, we sent each a survey asking for information about grade levels, subjects taught, and both teacher and student use of the Internet in the classroom (see Appendix A) To compensate participants for the time required for the study, we explained that the Tennessee Department of Education would sponsor those selected to attend the 1997 Tennessee Education Technology Conference. Out of 350 teachers who received surveys, 176 responded.

Third, to review the range of practices and contexts of Internet use, we sorted the 176 responses based on information such as Internet access, Internet experience, and classroom activities involving the Internet. Significant factors also included grade levels, types and locations of the schools (avoiding schools that had unusual technological advantages), subject matter taught, and ethnicity of the candidates. We selected 18 candidates through this process. These master teachers represented different grade levels in different geographic regions; we had difficulty, however, finding African-American teachers to reflect the ethnic diversity in the state.

Last, to further ensure that Internet use in these classrooms would involve students, we contacted these 18 candidates by letter and asked them to send a sample of their lesson plans. After reviewing these lesson plans, we selected 10 participants for the study. (Unfortunately, two participants later dropped out of the study because they lost Internet access). An African-American teacher was identified several months after the project started; this teacher replaced another participant who was unable to continue. In the end, the study consisted of eight participants, involving eight schools in different geographical regions of Tennessee (see Figure 1).

Figure 1: Geographic Representation of Eight Schools

The participants represented a variety of configurations of schools with students in



grades K-12. Although the sample originally included secondary teachers, for a variety of reasons none remained in the project for its duration. Instructional roles of participants included library/media specialist (1), special education teachers (2), regular classroom teachers (4) and technology teacher (1). Internet experience ranged from novice user to more experienced user, a departure by necessity from our original intentions. One of the teachers was African-American; the others did not represent any minority group. Although we obtained necessary permission forms for their participation in this study (see Appendix B), actual names of teachers, students, and researchers are not used in this report. Profiles of the eight classrooms are included in Appendix C.

Recruiting and training field researchers. The second phase of this study focused on recruiting and training field researchers. To identify qualified researchers, we contacted a number of professors in Tennessee colleges of education. Although our goal was to recruit graduate students from colleges in diverse geographic locations, the most

helpful contact was East Tennessee State University in Johnson City. Seven of the ten researchers who attended the initial orientation were in Johnson City and were either students or recent graduates of doctoral programs of the university's School of Education. Two additional researchers came from the Nashville vicinity; one was a professor in the College of Education at Tennessee State University, and one owned an educational consulting firm. Two researchers were added several months later, one to replace a researcher, another to work with a teacher identified after the project began. To ensure that researchers would have the skills needed to conduct the study, we asked applicants to submit vitae and transcripts. Expected qualifications for the researcher position included:

- strong writing skills,
- some knowledge of ethnography,
- experience in conducting interviews with adults and children,
- ability to maintain positive working relationships with adults and students in a school environment, and
- familiarity with the Internet and Internet terminology.

In addition to these qualifications, researchers were required to have and use an e-mail account and Internet access.

Researcher training for the study included an orientation, during which research procedures and protocols were reviewed and practiced and teacher assignments were made. We also developed and provided each researcher with an orientation manual containing background information about the project, instructions for site visits, interview and observation protocols, etc. (see Appendix D).

Site-based observations and interviews

Gathering and generating site-based information involved both on-site researchers and AEL staff, who continued to coordinate the project during this eleven-month phase, from August 1996 through June 1997.

On-site researcher activities. Each researcher made between six and eight visits to the classroom of their assigned teacher. For each site visit, the researcher observed classroom activities involving the Internet and wrote observation notes and a report. The researchers conducted interviews with teachers, administrators, students, and other significant players such as community volunteers. They also gathered relevant materials, including samples of Internet activities and any evidence of community involvement. Materials collected for this study consist of

- classroom observation reports,
- classroom observation notes,
- tapes of interviews with students, teachers, and administrators,
- drawings of classroom layout,
- photographs and videotapes,
- artifacts such as classroom materials and student work, and

- descriptive information about the school and community.

The report and all documentation were to be submitted to AEL within a week of each observation. Site-based research focused on how and why participating teachers were using the Internet. Participants were assured that the researchers were not evaluating their instruction but only observing Internet use in their classrooms. An important task of the researchers was to create a rapport with the participating teachers that would encourage forthcoming teacher interviews and reflection about their practices and their students' learning.

AEL coordination. During this site-based phase, AEL staff continued to coordinate the project and to build their understanding of the sites and Internet use. They communicated with the researchers via e-mail to discuss problems and concerns, answer questions, and provide further directions and feedback. In particular, the staff assessed the observation notes and reports and provided feedback to direct future visits and report writing. AEL staff also coordinated a mid-year meeting for researchers to engage them in discussions and analyses of the methodology and of their learnings about Internet use in these classrooms.

Analysis

For all phases of this project, it was important to have an agreed-upon definition of meaningful instruction and clear descriptions of engaged learning. As our lens for observing classroom instruction, we used the eight categories of learning and instruction developed by NCREL (Jones, Valdez, Nowakowski, Rasmussen, n.d.): vision of learning, tasks, assessment, instructional model, learning context, grouping, teacher roles, and student roles. (For a more detailed explanation of engaged learning see Appendix E.) This framework of engaged learning informed the planning of this study, guided site observations and interviews, and provided a context for analyzing site visit information. To some extent analysis was ongoing as site researchers observed and wrote notes and reports. Additional analysis occurred when the site observations were completed.

Limitations

Our research design is best described as meta-ethnography. While meta-ethnography provides the detailed descriptions needed to understand current use of the Internet for classroom instruction and to generate specific examples, it also has some challenges and limitations. These include

- lack of generalizability,
- inconsistencies in site-based researcher experience and quality,
- differences in level of teacher expertise, and
- logistical complexity.

Our research questions drove the design of this project and, in particular, the need for research sites that would provide the widest possible range of current Internet use in Tennessee classrooms. Sites included classrooms representing instruction in a variety of subjects in both urban and rural areas, in schools with various levels of economic support, and different ethnic mixes. Therefore, we were essentially looking at eight "samples." While we can make some assertions based on these eight descriptions, we cannot make comparisons between sites because of the range of contextual differences, nor can we make generalizations based on eight sites.

For a state wide project with essentially eight interrelated and concurrent ethnographic projects, it was essential to recruit the best possible site researchers and classroom teachers. Although we had established selection criteria for both researchers and teachers, not all researchers were experienced in site-based research methodologies. Additionally, the teachers whose classrooms were observed had uneven experience with using the Internet for classroom learning. While this range of teachers' abilities made it apparent that curriculum and pedagogical expertise are developmental, it also meant that we were not getting a description solely of early adopters' teaching with the Internet. It was also difficult to recruit a teacher pool with the ethnic diversity we preferred for the project.

Many of our challenges arose because of the size and complexity of the task of coordinating a project of this scope. Factors contributing to this complexity include geography, duration of study, number of site researchers and teachers, amount of data and number of reports generated. While the project was successful in generating a considerable amount of descriptive data, coordination of the site-based research phase could have been facilitated by allocating considerable more resources to coordination. We recommend that others who undertake similar projects have a full-time coordinator on staff.

Insights/Understandings

From holistic analysis of the research materials—classroom observation notes; field visit reports; transcripts of teacher, administrator, and student interviews, and classroom materials and student work—it is clear that rather than a study of experienced users, this study actually describes early stages of Internet use as a tool for meaningful teaching and learning. It suggests that instructional Internet use needs to be developed and supported. We will explore these issues in the context of our observations and theoretical framework.

To provide readers with some context, basic site descriptions are available in Appendix 3. The sites are labeled A-H; corresponding labels are used in the text.

Using the Internet For Resource Acquisition

Participating teachers commonly used the Internet as a resource for teaching. In several cases, students were assigned class projects for which they were required to

search for information on the Internet. Teachers also used the Internet as a tool to locate teaching materials and strategies. One researcher noted, "She [the teacher] thinks the Internet could help her with her classes, by giving her good ideas and by letting her get in touch with other teachers to get ideas for lessons."

One Internet project, involving a third-grade and a fourth-grade class illustrates this use of the Internet. The project, "Famous Tennesseans," was facilitated by a library/media specialist, but the teachers chose the topic. A report describes the project as follows:

> The students were first introduced to a listing of famous Tennesseans. They then brainstormed and compiled a smaller list of ten Tennesseans that they wanted to learn more about. The 3rd graders chose: Daniel Boone, Andrew Jackson, Elvis Presley, Wilma Rudolph and Ida B. Wells. The 4th graders chose: Davy Crockett, Sam Davis, Dolly Parton, Nancy Ward and Alvin C. York.
>
> The classes were divided into cooperative learning teams of 5-6 students each and assigned a person to research. Each team charted "What I already know about this person" and "What I want to know about this person." The students were trained by [the media specialist] in research strategies using all available sources, i.e., encyclopedias and other reference books, the Internet and WWW, and other electronic sources. Using various search engines and the WWW, the students collected information relevant to the topic and recorded their new findings. [Source: Teacher H]

Teacher D also used the Internet for resource acquisition.

> Teacher D's class uses the Internet on a semi-frequent basis. They use it as a building block for their other studies. They pull information off the Internet that they use in their projects. Their current project is about alligators and crocodiles. The project's goal is to help promote reading and oral communication. The projects are centered around language and derived from a book about alligators and crocodiles. Teacher D used the Internet to enhance the project. [Source: classroom observation and interview]

Although these examples suggest that the Internet functions like a book in these classrooms, student and teacher accounts reveal that the Internet is more useful because it provides more timely information and allows for more authentic learning tasks than do texts.

Accessing timely information. As one teacher remarked, the Internet has "more information available to classrooms, at your fingertips" [Teacher D]. Internet access in their classrooms enabled a number of teachers to create class projects concerning current issues. When making lesson plans and assigning projects involving the Internet, the teachers appeared to have fewer concerns about the availability of relevant information

for students to use. Furthermore, their teaching was not limited by the sometimes outdated information provided by textbooks.

For example, as the 1996 election approached, Teacher E wanted to use the Internet to give students background information on President Clinton's reelection campaign. The students traveled to the White House on the Internet. When asked how she would teach the lesson's content or what students would do to learn the content if access to the Internet were not available, the teacher responded:

> If they didn't have the Internet, they would have to rely a lot on newspapers, but if they did use the newspaper, I would have to make sure that each student had a copy or just read it to the whole class. The kids would not have the visuals. They could use videotapes if they wanted to, but the only thing they could really use would be Channel 1 or CNN Headline News or something like that, so they could get the most current information. But since all of these web sites are updated daily, they are about as current as you can get. . . . I would probably still be bringing in newspapers and current magazines and things like that. But with the Internet, I can just click on and find the local newspaper for mostly everyone. So it makes it a whole lot easier and whole lot faster and more current. [Source: Interview with Teacher E]

In addition, this teacher was able to use the Internet to help her students learn about the presidential election process. She found that CBS News developed a web site called *Phoebe for President* to introduce children to the political process. The students were asked to help Phoebe, a fictitious 15 year-old, run for President by suggesting a running mate, sending her ideas for speeches, and providing their opinions of Bill Clinton, Bob Dole, and events on the campaign trail. Commenting on the advantage of using the Internet to teach the unit, the teacher said, "There are some amazing people, apparently at CBS, who did this site and they keep it up to date. They are bringing in lots of different things and issues and the kids can get into that process. That is a major advantage because it gives something fresher than we could come up with. I'm not creative enough to write a whole thing about [the election process and issues]." Furthermore, she believes that she would not be able to teach the unit effectively if access to the Internet were not available. For her, teaching the unit "would be a lot harder to do because it would be hard to think up some of the things they came up with such as the daily diaries and things that my kids would have to write" [Source: Interview with Teacher E].

Facilitating authentic learning tasks. As teachers become increasingly comfortable with technology, they seem to involve students in more authentic learning tasks. A technology teacher who wanted to teach students Web publishing skills initiated a class project that engaged the entire community. A team of students, ages 12 to 14, constructed a project in which they researched and archived the history of their community. Documenting the history of this 400-member community provided a means for learning skills broader than simple technology use and accessment of information beyond the classroom. Students contacted residents and former residents to solicit their stories, old photographs, and other memorabilia about life in their town. As they worked

on the Internet-based historical project, the students not only developed new technical skills, but learned new things about their community as well. The project also had a positive impact on the community. It was the first time that its history had been documented. Reflecting upon the project, the teacher commented:

> I think the community was thrilled that we were doing the history of this community. The whole town...has helped us in preparing for this project. I think that the community is really starting to get involved in school activities. Our relationship within the community has grown stronger every day. [Source: Teacher B]

Thus, beyond learning the skills of creating web pages, the students created and benefitted from a successful community-based, community-centered curriculum project.

Using the Internet For Social Interaction

Use of the Internet not only enhanced students' social interactions in the classrooms, but also extended those interactions to the community and expanded their horizons to the larger world. One group of special education students reported exchanging information with students in Hawaii about their communities. This exchange was intriguing for many students because of the differences in climate, language, and culture. Students shared information about their interests; they also discussed projects and activities taking place in their classroom. Through this communication students discovered that they needed to learn more about their own community in order to tell others about it. In another classroom, third graders, assisted by the teachers, were pen pals with Tennessee University students on the Internet. In all instances, such interactions seem to have fostered among students a positive attitude toward learning. The interactions and communications via the Internet were meaningful in the following ways:

- making connections with the world,
- learning through extended information networks, and
- interacting with local communities.

Making connections with the world. A number of the schools in the study are in isolated rural areas; one advantage of Internet use in these classrooms is the connection students feel when they are able to communicate with the outside world. One researcher reflected on her observation of a rural school:

> The computers at the school and students' use of the Internet have actually encouraged the students' parents. The ones who can afford it [to] buy computers for their home. The school and community supports [Internet use] because they feel isolated and a little left behind and they feel this is a way for them to connect. I've talked to three kids and they all said the thing that excites them most is connecting. They don't care about the research. "Oh, yeah, I can find out information." What they really care [about] is "I have a pen pal." For example,

> one girl wanted a pen pal. Her brother got a pen pal in 4th grade and she wasn't old enough yet, so she went into her mother's work and sneaked on the computer and found herself a pen pal. Anybody [who] participated in cybercamp talked about Yugoslavia. They couldn't understand them [the Yugoslavian students] because of the Yugoslavian [language], you know that's what they told me, but they could see each other. So the connection outside, that's for them, being a rural community. [Source: AEL Interview with Researcher for Teacher H]

Learning through extended information networks. Teachers reported that connection to the outside world via the Internet has a significant impact on students' mindsets. According to one teacher, the concept that the students were no longer living in a small town but in a global community

> will help lead them to new ways of solving problems, and they will have world-wide resources to help them with a problem. When they need a friend they will have one in another part of the country that has an answer to their problem. When they want to learn, they are not limited geographically or by what is in our library. [Source: Interview with Teacher B]

Indeed, in our study we found students teaching and learning from each other on the Internet, overcoming geographical barriers. For example, using e-mail, a class of third graders in Tennessee and a class of second graders in Virginia studied now the difference in weather as it affected the growth of tulips that each class planted. [Source: Observation of Teacher H's classroom]

In another school, with the help of the teacher, a class of sixth graders discovered that "there is a world of resources to help them on the Internet, and they are learning how to find that help" [Source: Observation of Teacher F's classroom]. One student, for example, wrote the following letter that she wanted her teacher to send via e-mail to a poet in Arizona:

> Dear Grandpa Tucker,
>
> I loved your poem Sammy the Volunteer. It was really funny. I really appreciate you for spending your time reading our letters and writing us e-mail. This poem that I'm writing to you is pretty crazy but can you help me out on it? I love poems. I write one every night.
>
> My Weird Brother
>
> [The student included her poem here.]
>
> P.S. I hoped you liked it. Please send me a poem if you have a chance. If you see any changes I need to make please tell me.
>
> Your friend,

Interacting with local communities. Use of the Internet can create opportunities for students to interact with their community. It can also enhance students' self-esteem. As students become computer literate and learn to search the web, they can become teachers of their own parents and the community. One teacher reported that students' use of the Internet results in an "I can" attitude. According to Teacher B,

> At home, the parents are sometimes afraid of the computers. The kids learn computer skills and take them back home and it makes the parents feel good about their child and it makes the students feel good about themselves. Kids love the chat line and they learn to respond appropriately or be disconnected. They learn social/interpersonal skills. The computer is a good feedback tool. [Source: Teacher B]

Using The Internet For Intellectual Inquiry

The third element of meaningful instruction is use of the Internet to provoke and facilitate inquiry. The following examples describe how this use occurred during this study.

One example takes place in a technology class of 16 middle school students in a learning resource room for behaviorally disturbed students. With only one computer connected to the Internet, the teacher still stimulated student interest and inquiry. Just before the Thanksgiving holiday, the class took a virtual tour of the Plymouth Colony. The students learned about the Indians in the area, saw depictions of typical Indian dress and housing, and talked about pilgrim life. The vigor of the class discussion seems to indicate that the Internet can enhance engagement and intellectual development even in less-than-ideal conditions.

> Teacher B began the lesson by asking students about the origin of Thanksgiving. She asked, "What kind of houses do you think they lived in?" Amy answered, "Log cabins." Teacher B next asked, "What kind of clothes did they wear?" Jason answered, "Animal skins." Ned stated, "They wore church pants, buckles on their shoes, and a little hat." Teacher B then read aloud from the Internet information about how people dressed and lived during those times. She displayed pictures from the Internet of how pilgrims looked in 17th century clothing—an animal skin hat and baggy pants that were cut off at the knees. Jason asked, "What is he wearing?" Ned asked, "Did they wear these clothes in the winter? Why didn't they make their pants longer?" Teacher B answered both of their questions. Teacher B next showed what their houses looked like. She stated some were built underground. All of the students appeared very interested. One student stated, "It is very cold in caves." The Internet had some lag time. The conversation between the students and the teacher continued. . . .

> Chris asked, "Don't they have doors?" Teacher B stated "yes." Chris continued to explain himself by stating " I mean, don't they have something they can shut?" Ned stated, "I bet they always had guns if their doors were open in case they saw birds or bears." Teacher B talked about the type of animals in that area of the county. Chris then talked about the weight of the animals. Chris stated the house looked like straw. Teacher B commented on the ladies in the scene on the Internet. She told students to look how they were dressed. She stated that it was part of their tradition to cover their heads. Teacher B explained they could not speak up in church. Ned asked, " If women were asked a question, they couldn't answer?" A student asked why women couldn't speak up in church. Teacher B answered this question. All of the students appeared very interested at this point. (Source: Teacher B)

Another session involved a virtual tour of the Mayflower featuring documents about the people on board and illustrations of their daily life on their way to the new country. The information provoked students to ask questions and to compare the pilgrims' lives to their own:

> Upon seeing a list of people on board the Mayflower, one student asked, "How did they know the names of the people if they are dead?"
> Another question concerned punishment for crimes: "Are people hung today the way they were hung then?" One student asked, "Did they date back then?" And, in response to the information that one female had 50 males interested in her, "If girls had a body then, they got in trouble." In reaction to information that girls and boys wore the same kind of clothes (dresses), students asked "Did the boys wear hats? How could they play sports with dresses on? How did they wash their clothes?" In reaction to information about a 14-year-old boy who got in trouble while on board, a student said "That's me! and on hearing that everyone drank beer, another commented, "My children won't drink beer!" On hearing about the cost of building the Mayflower, students asked questions about how and where it was built. (Source: Teacher B)

When asked about how the class's virtual tours via the Internet diverged from what she had expected, Teacher B commented, "They seemed to get a little more into the (roles of) girls than I expected them to. They really started to come up with hypothetical questions. They began to ask, 'what if they this,' and 'what if they did that?' They are really inquisitive about these things. I wasn't expecting them to ask these questions that I couldn't even answer." (Source: Teacher B)

Information in textbooks is perforce limited and directed toward specific curriculum objectives that are often of lower cognitive levels (i.e. "The student will know A; the student will understand B"). Such information and objectives can encourage memorization and recitation over reflection and analysis. Information available on the Internet can be richer and more eclectic. It can invite students to relate information they find to their own lives; stimulate questions outside the often narrow box of content

knowledge objectives, and provide answers to questions unanticipated and unresearched by the teacher or textbook author. It becomes easier to exploit the "teachable moment." At the same time it calls for different instructional strategies, greater flexibility and more willingness to follow student interest and facilitate student exploration.

The following example of intellectual inquiry via the Internet is an example of such teaching. In a sixth-grade classroom including special needs students, Teacher F uses the Internet to teach students to write and appreciate poems. Using e-mail, she established relationships with four poets: the curator of "The Poetry Garden" WWW site; a retired teacher and former vice president of Houghton Mifflin Publishing Co.; a poet in Arizona; and a poet in Virginia. In this classroom learning occurs through a social network extending beyond the classroom. Teacher F. describes how she used the extended learning environment on the Internet and collaborated with these poets in planning lessons and nurturing student interest in language arts.

> I began the year by introducing the students to the sound of poetry by reading a poem each day. Usually the poems are taken from the Internet and displayed on the large-screen television. We also use the Encarta '95 multimedia encyclopedia to pull up famous poets and learn about their work and about their lives. As the enjoyment of the poetry reading increases, the children try writing their own poems. Early in the year I provided a topic for their writing, but now they usually choose their own topics.
>
> Our volunteer poets have written countless letters to the students as they help with the finer points of poetry writing: meter, rhyme, form, and style are examined. Often I send an e-mail message to Mr. Nelson, Mrs. Dowd, or Mr. Tucker (affectionately known as "Grandpa Tucker") and give them additional insights about the abilities of the students. When the students read their e-mail, they revise the poem using the word processor and then submit it for publication. [Source: "Banyan Tree Friends"]

As these examples illustrate, teachers' current use of the Internet indicates the potential value of the Internet for facilitating inquiry. Our study suggests that using the Internet in classrooms can enhance students' intellectual development by

- improving student language and writing skills,
- energizing student learning,
- encouraging student exploration, and
- promoting active learning.

Improving student language and writing skills. As students work on authentic learning tasks and as they engage in communication with people from different cultures and with different backgrounds, they become more aware of language use in general. In the poetry class, for example, the students write poetry that is read and treated with respect by professional poets. Because their work is meaningful to them and reaches a real audience, they are motivated to treat their own and one other's work with respect.

Also, as the poets ask for their reactions, the students read their work with intense interest. As a result, their language skills developed more rapidly than if Teacher F were using conventional teaching methods. In an interview, Teacher. F commented on student responses to a poem written by Grandpa Tucker:

> They fell on it like candy. As I asked each child to read a verse, there was rapt attention, and the readers were decoding. In the sixth grade, decoding usually means structural analysis, diacritical markings, and things which aren't meaningful to students. If they have reading problems and experience a lot of failure in the lower grades [then] they don't want to do any sort of direct skill practice. In reading the poetry written by their adult friends and their classmates they work on comprehension and decoding because they want to understand what they're reading. Also, vocabulary development is rapid as they write their own poems and as they read each other's poems. Punctuation, grammar, syntax, and comprehension skills are learned with great effort [meaning students devoted more time and attention to learning these skills than they used to], more enjoyment, and far more effectively than I have ever seen in my eighteen years' of classroom experience. [Source: Teacher F]

Other teachers in our study corroborate Teacher F's positive experience in using the Internet to teach language arts. One teacher commented that "most [students] have picked up their reading comprehension because they have finally found something that they want to read" [Interview with Teacher E]. Another teacher noted that "their interest in spelling and sentence structure improved because they did not want to appear to be dummies." A nutrition class teacher explained how the graphics on the Internet helped her third graders learn "big" words like *invasive*:

> The accompanying graphic showed a picture of surgery, so that automatically tells you that *invasive* must mean that we are going to enter into this. So, they may not know the exact definition of a word, but they get an idea of what it means from a picture and from the way it's used in the sentence. And they are learning the context meaning from that. It stretches them to read and do this. . . .but they are interested, and it may push them to want to learn more. [Interview with Teacher A]

Energizing student learning. In all cases, researchers' observed that students are highly enthusiastic computer users and that this enthusiasm energizes student learning when teachers use the Internet as an instructional tool to promote intellectual development. In one school, for example, students didn't want to miss any computer classes even when they were sick because they only got to work on computers once a week [Source: Interview with researcher for Teacher B]. In another school, an eighth-grade student described how the Internet stimulated his interest in learning; "First, I thought [a technology class] was going to be some weird stuff, but it was fun and I liked it. I got to see different stuff that kids in the regular class had not seen. I asked my little brother about it and he said he had never seen it." Our researcher asked, "Is it what you expected it to be?" The student replied, "No, it's fun. I'm not going to lie, I thought it

was going to be real boring, but I liked it. I'm pretty sure other kids would like it too." [Source: Student Interview by researcher of Teacher E].

Likewise, teachers also reported that use of the Internet energized learning and motivation among their students. For example, one teacher stated that the main difference for her between teaching with the Internet and without is "their [students] enthusiasm is going to be extreme with the Internet rather than just a plain lesson." Another teacher remarked

> I see more stuff that they have really learned on their own, because they thought that it's interesting. You can hear them talking to other kids in the class about stuff you would have never heard them talk about before. In fact, some of the administrators have noticed that my kids went in and said something about "I did this; therefore, I must be in big trouble." The administrator looked at him and said, "Where did you hear *therefore*?" The student responded, 'We use that a lot in Teacher. E's class.' We have seen a change in their communication. [Teacher E]

Encouraging exploration. As students' interest in learning grew through the use of the Internet, they also seemed to take more responsibility for their learning. When they explored on the Internet, they tended to choose their own learning tasks, deciding what information they needed for a particular project and where they would go to search for relevant and interesting information. Exposure to the large volume of information on the Internet also led students to realize that classrooms and textbooks are not the only places where they can find knowledge and information. Once they learned Internet skills, they could explore and learn on their own. To many teachers, this independent exploration and learning is the most important value of using the Internet in classrooms. Teacher B, for example, holds the view that "kids can explore when they find something interesting in their world. Kids who like sports and want to know about certain players, can use the Internet to find these things. They have to learn the skills necessary to find out what they want to know." [Source: Teacher B].

Similarly, another teacher pointed out that using the Internet gives students skills and tools they will use in future careers ranging from construction to health care.

Promoting active learning. When students have access to the Internet, they have a certain amount of control over what they learn and have opportunities to explore new ideas on their own. In response to student interest, teachers tend to move naturally toward the role of coach/facilitator. The following observations, the first made early during the study and the second a month later, depict a teacher who was accustomed to a teacher-centered approach in which class content was controlled and taught by rigidly following the state curriculum guide. As her Internet use developed, the teacher began to feel comfortable assuming the role of a facilitator.

> Upon entering the lab, Teacher A told the children, "If you don't have a chair (at a computer), we'll take turns." Two children each sat at the computers while others gathered around. Teacher A proceeded with instructions: "Go to CANCEL; go to

NETSCAPE." "No, don't go to bookmarks, Maria. Go to Netsearch. "Some of you go to Lycos; some go to Yahoo." "Now find 'Food/Pyramid/Guide." "Roll it up with your roller [scroll]. Students, do you have the pyramid? [Students responded "yes."] "O.K., but does it tell you the information you need? [Students responded "no;" Teacher A observed their progress]. Most everyone's finding what they need. When you get all your servings, type in: DOLE5ADAY. Find out what's there. Click on 5DAY Virtual Classroom. Click on fruits and vegetables."

At this point, most students could not get to DOLE5ADAY. Only one computer was able to access the Web site. After numerous efforts, she told the children, "Because we're running out of time, I'd like for all of you to come over here." She sat down at the computer, the students gathered around her. She asked, "Who had the pear?" She then found the item at the DOLE5ADAY site and called out the information to the appropriate group, which then transferred the information to worksheets. Teacher A made comments about the various items as information was discovered. For example, she commented, "Can you believe that eight strawberries have 70 calories!" She noted for children that a tomato was listed as both a vegetable and a fruit. Green beans, it was noted, would be good for a person. "Why" she asked, and the students responded in unison, "It has lots of fiber." She asked students, "Which is better, broccoli or oranges?" "Broccoli" they responded. "Why?" "It has more vitamin A," they responded. After everyone had gathered their information, she told students that it was time to return to the room. They were to color their pyramids. [Source: Classroom observation of Teacher A]

However, about a month or so later, our researcher made the following observation about the same teacher's classroom:

12:53 - Prior to taking her multiage group to the computer lab, Teacher A briefly reviews simple machines by using a pair of scissors as an example; she then reminds students that compound machines are made up of simple machines. She tells them they are going to the lab to look at examples of compound machines by visiting the robotics site she has bookmarked for them. She tells them they may view as many robots as they wish; they are to look at them to (1) see how many simple machines they can find in each robot they pull up, (2) determine the purpose of the robots they observe, and (3) get ideas for building their own robots (a project previously assigned to students). She reminds them that their own individual robots must (1) have a name, (2) have a specific purpose, and (3) be made up of simple machines that they can name.

1:00 - Students go to the lab and log on to the Internet; they go to "bookmarks" and pull up www.robotics.com; this leads them to the Robot Menu, which has a table of contents listing many different robots by name. [I can't help but notice how comfortable these children have become with using the Internet; they went to

their stations, logged on, pulled up the assigned bookmark, and waited patiently while the site loaded, all with little assistance from the teacher].

The students go to "Let's get Gadget" [from the menu]. The robot appears and students say, "It's a remote control car!" Another group pulls up "Grover' 95," another, "Stic Insect." Students like this one in particular, and Teacher A says, "What kind of simple machine do you see?" The group replies, "An incline plane." Other robots pulled up were "Pinocchio and Gigantor" and "River Rat." One group seems fascinated by names, because each of the robots the group pulls up had a person's name: Shaz, Katharina, Bobby, Harold, etc. Students kept a log of their findings, listing the name of the robot, its creator, and its function. The images of the robots were very slow in coming to the screen, but students were very patient; while waiting, they checked out other groups' findings, sharing information. Teacher A looks at some of the robots as they come up, always commenting, "What simple machines do you see?" or making personal comments such as, "I'd like to have that one [one that sweeps floors, for example] at my house!" For the most part, though, the teacher stands back and lets the children work on their own and share as they wish.

2:00 - Teacher A tells students it is time to leave, and there are unhappy groans from everyone. She commends the students for their work, their sharing with one another, and their patience with the slowness of the Internet.

This is the most freedom I've seen the children have to truly explore and interpret on their own and be free to share their findings with one another. Today Teacher A functioned as a facilitator only, keeping her distance and maintaining a hands-off posture unless needed. As for the children, they were totally engaged; I didn't see a single student off task, including the first graders. It was, I think, learning at its best—and the type of exciting learning that can take place on the Internet when children are allowed to explore on their own.

Teacher A commented on her changing role in the classroom during one interview. She stated that once students were allowed to explore on their own, they tended to interact with each other more, and they helped each other solve problems. Furthermore, she noted "very few behavior problems." They were all involved. . . .When they're all in there and it's something they like, like today's lesson [the White House tour], going to something they can explore on—they like that a whole lot better than when I just punch it up and say, 'okay, look at this and this is what I want you to see.' They want to do it themselves. So, if you can bookmark it and you know everything on that site is okay for them to look at, I think it's a good thing." [Source: Teacher A]

Although we found instances of successful classroom use of the Internet for intellectual inquiry, teachers had to overcome many barriers to make this effective instruction happen. The wide range of classroom practices and circumstances in which teachers currently use the Internet (see Appendix C) suggests a need for improved

Internet access as well as professional development specific to Internet-based materials/pedagogy and appropriate assessment of engaged learning.

Teacher Needs For Effective Internet-Based Instruction

Improved Internet access. Although participating teachers had expected to have adequate Internet access during the study, in practice, access varied among the schools according to the number of Internet accounts per classroom, the Internet provider used, available search engines, etc. Sometimes a classroom had only one computer connected to the Internet. Other classrooms met in computer laboratories that supported multiple connections. Researchers also reported long lag times, shutdowns, or freeze-ups of systems, which disrupted teachers' lesson plans. Some teachers used personal computer accounts and spend personal money on software packages for their classrooms. The problem appeared to result from lack of funds. One administrator, commenting on the school's use of the Internet, stated

> This school, like many other schools, is getting further and further behind as technology explodes onto the world stage. I think many schools are dragging their feet on keeping up with changes in technology. I am really afraid that schools are suffering a lack of appropriate funding for new information age kinds of technology.

According to this administrator, Internet use was just a curiosity for many teachers in his school "because they do not have personal access, nor training, nor involvement with the Internet." [Source: Interview by Researcher for Teacher E]

On the other hand, in one teacher's view, providing Internet access and support was not merely a money problem, but also a problem of lack of understanding about the Internet and its use in education in general. According to this teacher,

> In some ways we get a lot of support and in others we don't because so few of the administrators know how to use computers. They don't see what you can do with the kids. They just don't budget for that. Right now they think that if you send somebody to a two day conference to learn to use Windows 95 and spend $300 on it, that's a great thing, when most of the stuff you can pick up in a $15 book. They will throw money on certain things and other things they won't. [Source: Teacher E]

Lack of funding and, perhaps even more important, lack of understanding about ways to successfully use technology in the classroom led to inadequate Internet access and technological support for some of the teachers in our study. Although teachers wanted to make effective Internet instruction happen in their classrooms, they faced significant difficulties. For example, teachers must develop classroom management strategies to enable them to keep students actively and productively engaged when working with a limited number of computers. Students easily become distracted because

of lag times, shutdowns, and system freeze-ups. While many teaches were successful in managing these challenges, other teachers experienced difficulties. For example, in Teacher B's classroom, students whose computers did not have the Internet connection necessary for working on their project were allowed to play computer games [Class observation notes by Researcher B]. Another teacher, who had not yet developed successful management strategies for using limited resources, expressed frustration.

> We do not have enough workstations. If we had workstations for every student, it would reduce fights over computers. There would be fewer scheduling problems with other kids coming in to use computers during class. [We] would do more research projects in class if [we] had more computers. Sharing computers causes problems. [Source: Teacher H]

Teacher C stated that the greatest drawback of using the Internet was "some of the information not coming up as quickly as you would want it to." The teacher went on to say that "I did have one computer freeze and it did that twice earlier today. You have to be comfortable enough to go over and talk to them [the students] as you fix the computer. When it wasn't going well the kids would say 'This is boring' " [Source: Teacher C]. A third teacher reported that with a 14.4 modem it took her 30 minutes to access the graphics that she wanted the students to see. Such frustrating classroom experiences "drove me nuts!" [Source: Teacher E]. These situations illustrate teachers' need for additional technology tools (both hardware and software) to improve Internet access and professional development in classroom management strategies to make effective instructional use of the Internet.

Professional development specific to Internet-based materials and pedagogy. Although our research documents engaged student learning with the Internet, Internet use does not automatically result in good curriculum or good pedagogy. Some classroom activities with the Internet were shaped by the teachers' personal interests and experience with the Internet rather than by students' learning needs. As a result, instruction using the Internet at times appeared to be ad hoc and to have little coherence with educational aims. At other times teachers had specific goals to accomplish in their classrooms but lacked pedagogical understanding of how best to use the Internet to accomplish those goals. In one case a teacher used the Internet only as an information resource, assigning students to search for certain information on the Internet. But instead of looking for the information, the students simply looked at computer screens [Source: observations in Teacher G's classroom]. Observations such as these suggest that teachers may need coaching or other support to learn to integrate curriculum and pedagogy to benefit from all dimensions of instructional Internet use—material, social, and intellectual.

Furthermore, because use of the Internet as an instructional tool seems to be changing the dynamics of the traditional classroom, teachers who were trained in teacher-centered traditional instruction models will need to explore new instructional models and learn to add the roles of facilitator and coach to their repertoire in order to assist students in active learning. Apart from technology application, specific areas of training relating

to the Internet use will need to include classroom management, grouping of students, community involvement, and development of authentic tasks, and assessment of learning.

Appropriate assessment of engaged learning. Researchers, teachers, and students indicated that use of the Internet in the classrooms gave students more control of their learning. When students learned how to use e-mail and search engines and to create their own Web pages, they were no longer limited to narrow perspectives on issues. They also became creators, not merely reproducers, of knowledge. As a result of these activities, teachers, researchers, and students reported that students had higher self-esteem and were motivated to learn on their own.

These teachers tended to incorporate active learning factors—such as participation, motivation, and ability to accomplish goals—as part of their assessment of students' learning. They face a dilemma, however, when indicators of engaged learning are not part of formal curriculum assessment. One teacher commented that she felt some pressure to make her class activities fit into the state curriculum guide. She explained that "if you don't follow it at least several times a year, and you do come up for evaluation every third year, then you don't remember all the things to get checked off" [Teacher A]. Other teachers who were creatively integrating Internet use in their classrooms by incorporating current and timely information, authentic learning tasks, and multicultural experiences believed they would have difficulty getting these learning aspects recognized by the formal evaluation system.

Summary

The information in this report illustrates that using Internet-based instruction in the classroom does not guarantee good curriculum or pedagogy. Our descriptive research does suggest that teachers on the forefront of Internet-based instruction are providing some learning experiences that do not happen (at least in the same way and to the same extent) when the Internet is not used. Furthermore, because Internet technology and its instructional uses are rapidly evolving, we believe Internet use can increasingly become a meaningful part of classroom instruction, despite the many difficulties teachers currently have to overcome. We return to the three questions that guided this project:

- Can the Internet become a part of meaningful instruction?
- What sorts of professional development activities support use of the Internet as part of meaningful instruction?
- Under what conditions can the Internet be an effective tool for enhancing students' intellectual development?

Can the Internet Become a Part of Meaningful Instruction?

Based upon our analysis of the volumes of descriptive data collected in this study, we argue that with skillful use, the Internet can become a valuable tool to facilitate

meaningful instruction. The framework of resource acquisition, social interaction, and inquiry proved a useful lens for examining classroom activities with the Internet. Furthermore, we believe the framework may also be useful for those planning professional development for teachers and those exploring appropriate assessment of Internet-based instructional experiences. We identified the following uses of the Internet in classrooms:

- accessing timely information,
- providing authentic learning tasks,
- making connections with the material and social world,
- learning through extended information networks,
- interacting with local communities,
- improving students' language and writing skills,
- energizing students' learning,
- encouraging exploration, and
- stimulating inquiry.

We believe that the development of such a variety of specific uses at this early date indicates the potential of the Internet as a tool for enhancing learning. We have documented that classroom use of the Internet is not merely a glitzy, expensive way to access information or to "put some gee-whiz" in teaching. This study illustrates the developmental nature of teachers' use of the Internet for meaningful instruction.

What Sorts of Professional Development Activities Support Use of the Internet as a Part of Meaningful Instruction?

Circumstances apparent in many of the research sites suggest that professional development activities be specifically designed to address instructional uses of the Internet in the classroom. Based upon this study, we believe that effective professional development should do the following:

1. Engage schools and communities in ongoing efforts to provide an adequate technology base for classroom instruction. The Internet should not be regarded as stand-alone technology. It should be part of a learning toolkit for both teachers and students, composed of mutually supporting multimedia resources.

2. Provide sustained support for teachers to develop meaningful Internet learning opportunities for their students. A one-shot workshop approach does not provide enough understanding or motivation for teachers to effectively integrate the Internet into their teaching. A tiered approach, offering "just-in-time" knowledge and support, is more effective. Additionally, teachers need to be encouraged and supported in developing their own Internet communities for professional learning and stimulation—a process that takes place over time.

3. Recognize and reward teachers for their time and innovative work in using the Internet to enrich and enhance the material, social and intellectual dimensions of

the classroom. Specifically, teachers should be given planning time for classes they teach with the Internet; they should also have technical assistance available to them when needed. Technical assistance should not be limited to hardware and software issues, but should be available for curricular and assessment issues.

Teachers involved in the study report to us that the study process itself has been beneficial, stimulating them to reflect on their curriculum and pedagogy. Many of their visions of learning have been challenged and expanded. This study not only reinforces the value of teachers' involvement in research, but suggests that all teachers may benefit from professional development that encourages them to engage in reflection on their own practice.

Under What Conditions is the Internet an Effective Tool for Improving Student Achievement?

Our study suggests that the following conditions are necessary but not sufficient to make the Internet an effective tool for improving student achievement:

1. To enable full and effective support for teachers, administrators and communities need to be aware of and understand the multiplicity of uses of the Internet for meaningful classroom instruction. To maximize its potential, the Internet must not be viewed merely as a new information resource or an electronic mail system. Teachers should creatively integrate the material and social aspects of the Internet use to enhance students' intellectual development.

2. As with other methods of instruction used to promote engaged learning, the value of the Internet for facilitating student learning needs to be appropriately assessed. Teachers, students, administrators and parents must appreciate engaged learning and have some degree of consensus on appropriate methods of learning assessment. With appropriate assessment methods, tools, and strategies, teachers may feel more support and motivation to use the Internet as a tool for intellectual inquiry in their classrooms and some basic needs must be met.

- Sufficient equipment must be available to make use of the Internet during class time feasible.
- Internet connectivity must become faster, more reliable, and accessible in classrooms.
- In order to capitalize on the Internet's potential, funding must be allocated to support ongoing needs. These needs include equipment, professional development, Internet subscriptions, and on-site support and maintenance.

The Internet is not a panacea; when used for instructional purposes, it is only as powerful as the curriculum it supports. It is quite possible to use the Internet and not exploit its full potential. Powerful use of the Internet requires teachers to broaden their

visions—embrace and capitalize on the Internet's unique contribution to rich, rigorous, and relevant curricula. The potential of the Internet for supporting and improving curriculum and instruction lies not in the tool itself, but in the hands of those who use it.

References

Brown, R. (1991). *Schools of Thought: How the Politics of Literacy Shape Thinking in the Classroom*. San Francisco: Jossey-Bass.

Campoy, R. (1992). The Role of Technology in the School Reform Movement. *Educational Technology*, 32(8), 17-22.

Carpenter, J., Farris, E., Heaviside, S., Malitz, G. (1995) *Advanced Telecommunications in U. S. Public Schools, K-12*. Washington , D.C.: U. S. Government Printing Office.

Cuban, L. (1993). Computers meet classroom: Classroom wins. *Teachers College Record*, 95(2), 185-210.

Ertmer, P., & Newby, T. (1993). Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from a Design Perspective. *Performance Improvement Quarterly*, 6(4), 50-72.

Honey, M., & Henriquez, A. (1993). *Telecommunications and K-12 Educators: Findings From a National Survey*. New York: Center for Technology in Education. (ERIC Document Reproduction Service No. ED 359 923)

Honey, M., & McMillan, K. (1993). *Case Studies of K-12 Educators Use of the Internet: Exploring the Relationship Between Metaphor and Practice*. New York: Education Development Center, Center for Children and Technology. (ERIC Document Reproduction Service No. ED 372 726)

Howley, A., & Howley, C. (1994, October). *Receptivity to Telecommunications Among K-12 Teachers in a Rural State: Results of a West Virginia Survey*. Paper presented at the annual meeting of the National Rural Education Association, Tuscaloosa, AL. (ERIC Document Reproduction Service No. ED 374 958)

Howley, C., Howley, A., & Pendarvis, E. (1995). *Out of Our Minds: Anti-Intellectualism and Talent Development in American Schooling*. New York: Teachers College Press.

Hunter, W. (1994). Sometimes Face Value Should Be Enough. *Writing Notebook: Visions for Learning*, 11(3), 22, 35.

Kids Count Data Book (1998). Baltimore, MA: Annie E. Casey Foundation.

Levin, B. (1993). Students and Educational Productivity. *Education Policy Analysis Archives*, 1(5). [electronic journal, available: edpolyar@asuacad.bitnet; Gene V Glass, Ed.]

Postman, N. (1992). *Technopoly: The Surrender of Culture to Technology*. New York: Knopf.

Prather, P. (1993). Reform Revisited: the Trend Toward Constructivist Learning. *Journal of Elementary Science Education*, 5(2), 52-70.

Rothenberg, D. (1994). Information Technology in Education. *Annual Review of Information Science and Technology*, 29, 277-302.

U.S. Department of Education, National Center for Education Statistics (1997). Survey on Advanced Telecommunications in U.S. Public Schools. *FRSS*, 64.

APPENDIX A

TEACHER INFORMATION SURVEY

_____ YES, I am willing to be considered for participation in this study.

_____ NO, I do not wish to be considered for participation in this study.

NAME _____

(If you checked yes, please complete the rest of the questionnaire. If you checked no, stop here. When finished, return this form in the self-addressed stamped envelope.)

SCHOOL NAME_____

SCHOOL ADDRESS_____

_____(ZIP)_____

WORK TEL. NO. _____ BEST TIME TO CALL _____

HOME TEL. NUMBER _____ BEST TIME TO CALL _____

FAX _____ EMAIL _____

Grade level(s) taught _____ Subjects taught, if applicable_____

Using >T< for teacher, >S< for student and >B< for both teacher and student, please indicate all that apply in the columns below.

I and/or students under my supervision use the Internet for:

_____Resource sharing

_____Individual projects

_____On-line publishing

_____Collaborative projects with other classes

_____Seeking expertise on project topics

_____Collaborative projects with other individuals

_____WEB page creation

_____Communication

_____Desktop conferencing

_____Networking with colleagues

_____Professional development

_____Recreation

_____Resource acquisition:

___lesson plans

_____photos

_____movie clips

_____audio clips

_____articles

_____data

_____Other (please specify)_____

_____

APPENDIX B

STUDENT PERMISSION FORM

TENNESSE PROJECT - STUDENT PERMISSION FORM

Appalachia Educational Laboratory
P.O. Box 1348
Charleston, West Virginia 25325

Authorization to use Survey Responses, Photographs, and Videotapes

I,_____,
hereby authorize the Appalachia Educational laboratory to use survey and interview responses from my child and photographs and videotapes of my child. I understand that these items may be used either in their entirety or in segments, whichever is , at their discretion, appropriate for the accomplishments of their intents and purposes. I agree that these items may be used for publication, videotapes, audiotapes, television or any other lawful purpose. I understand that I do not have the right of inspection or approval of interview responses, photographs or videotapes prior to their publication or other use.

Student:_____

Signature of Parent or Guardian

APPENDIX C

SITE PROFILES

SITE PROFILES

	Grade	Teacher Assignment	Internet Access	Professional Development
Site A	first-third grade; multi-age	Regular classroom All subjects	Computer lab; 4 Internet connections	Internet workshops
Site B	seventh and eighth	Computer enrichment	Computer lab; 4 workstations Internet connected	Self-taught Internet skills
Site C	third	Regular classroom All subjects	Computer lab; 3 Internet connections	Internet workshops; Professional development workshops
Site D	third	Special Ed Resource; Language Arts	One Internet connection	Classes at a university on use of technology in the classroom
Site E	sixth to eighth	Exceptional technology Special Education	One Internet connection	Pursuing a Master's degree in Education Technology
Site F	sixth	Language Arts Regular classroom	One Internet connection	Self-taught
Site G	third	Regular classroom All subjects	6 Internet connections	Self-taught and professional development workshops
Site H	third	Media specialist	Media center with 6 Internet connections	Self-taught; one course at University of Tennessee, Knoxville; use of computers in libraries

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APPENDIX D

INITIAL SITE VISIT
CHECKLIST FOR CLASSROOM OBSERVATION

Initial site visit

Information submission checklist

(Check for completion and submit this form and all accompanying materials to AEL with your first site visit report)

Signed permission forms

___student forms for each class

___teacher form

School- and district-related documents

___school technology plan
___curriculum guide
___other technology documents
___professional development plans
___school brochure
___faculty newsletters on technology/prof. devt.
___school newspaper
___urls for on-line information about school

___district technology plan
___course descriptions
___school-wide planning documents
___professional development offerings
___school improvement plan
___school newsletters
___relevant newspaper articles
___other documents relevant to school and district

___copies of any videotapes or other presentations of school tech. use

Scores, demographics, and related contextual information

___TCAP scores by class and school
___school demographics

___community newspaper

Photographs, curriculum materials, student work

___photographs with captions
___labeled handouts, copies of readings or assignments and other materials used by teacher
___copies of lesson plans and unit plans
___samples of student work, labeled as to high, low, average

Schedules

___teacher's schedule of classes
___list of classes to be observed

___school calendar
___schedule for next site visit

Notes, observations and reports

___ typed report
___classroom observation protocol
___classroom sketch
___interview tapes
___notes from student interview
___teacher debriefing notes
___notes from any interviews of other teachers
___pre-observation information form
___information about computer cap.
___classroom layout comment sheet
___classroom observation notes
___notes from teacher interview
___notes from walk-through
___notes from administrator discussion

CLASSROOM SKETCH

For each room in which you observe a class using Internet

Teacher _____ Course _____ Date _____

Complete sketch on graph paper. Classroom - desk/chair placements, computer stations, placement of bulletin boards, chalk boards, teacher's desk, significant equipment or other items

Complete this form at first observation. On subsequent observations, complete the sketch only if there is a significant change from the original sketch.
TAKE PHOTOGRAPHS OF THE ROOM TO SUPPLEMENT YOUR INFORMATION.

Comments on classroom layout:

INFORMATION ABOUT COMPUTER CAPABILITIES

(Complete this form at first obsservation, and complete on subsequent observations, only if there is a significant change.)

Can they do graphics? Do they have sound cards, run Windows? Is there a color printer? How is the classroom connected to the Internet (56kb line, T-1 line, T-3 line, etc.)? If the connection is by modem, how many modems and phone lines are available? What are the modem speeds? What software do they use for e-mail? For connecting to the World Wide Web? What other programs are available on these computers and used by the students and/or teacher in this class (word processing, desk-top publishing, multimedia, spreadsheet, data-base, other)? Where are the computers that are used for Internet physically located?

FIRST TEACHER INTERVIEW

_____ Tell me about your philosophy of teaching/learning.

_____ What evidence do you look for to tell you whether students are learning as you want them to. What are your goals for students. What would students need to know or be able to do in order for you to point to them with pride as examples of success as students.

_____ Describe your view of an ideal teacher.

_____ How has access to the Internet changed your vision of teaching and learning? Elaborate.

_____ Tell me about how you first started using Internet (personal use). How do you use it now?

_____ Do you have a personal account? What provider do you use? Do you go on-line mostly at school or at home?

_____ Talk about how you began using Internet with your class.

_____ When there are snafus with the equipment, programs, what do you do? Talk about a recent incident. Who helps you?

_____ In the lesson or project plan you submitted as part of your application to be considered for this study, describe in greater detail what students did.

_____ Do you have someone you would describe as a mentor or resource for planning in using the Internet in instruction? If so, who and how do they help? Ask for examples.

_____ Are there things you would like for your students to be able to do on line that can't be done with the current level of technology in the building? Explain.

_____ Is the kind of work students do with Internet substantively different from the work they did when they had no Internet access? Explain.

_____ Describe some of the ways you assess student learning. Give some examples. Have your assessment methods changed since you began using the Internet? Explain.

_____ Comment about the most satisfying or valuable experiences you feel students have had in using the Internet.

_____ Comment about the least useful or most frustrating experiences you and/or your students have had using the Internet.

CHECKLIST FOR CLASSROOM OBSERVATION

The items below should be used in each site visit report and sent with the report to AEL:

_____ **Classroom observation protocol form**

_____ **Sketch of classroom (if changed from original sketch)**

_____ **Information about computer capabilities (if changed from original description)**

_____ **Pre-observation information form**

_____ **Photographs of classroom**

_____ **Classroom observation notes**

_____ **Copy of lesson plan, unit plan and any other relevant information.**

_____ **Notes and tapes from student interview.**

_____ **Teacher debriefing notes and tapes**

_____ **Samples of student work**

_____ **Student interview notes and tapes**

PRE-OBSERVATION INFORMATION AND INSTRUCTIONS

To be completed for each visit for each class observed.

Before the observation, ask the teacher for a general description of what the class will be doing. Record below. Ask for a copy of the lesson plan for the day's class and arrange for a de-briefing session with the teacher after your observation.

CLASSROOM OBSERVATION PROTOCOL

To be completed for each visit.

Visit number _____ **Date** _____

Teacher name _____

Course name _____

_____

Complete the information below on the initial visit. On subsequent visits, complete any items that have changed since your previous visit. Otherwise, leave blank.

Class size _____ **#males** _____ **# females** _____

Student age range _____

"Ability level" grouping or "track" (if mixed grouping, so indicate)

_____

Describe ethnic/racial make-up of class.

_____

_____

_____

_____

_____

Any other pertinent information about the students

_____

_____

_____

_____

Researcher_____ Date_____ Class_____ Teacher_____ School_____ Page 1

NOTE TIME WHEN ACTIVITY CHANGES	OBSERVATION	COMMENT/INTERPRETATION

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Student Interview Guide
To be completed for each student you interview.

A. Background information

1. Why did you choose this class (if applicable)?

2. What did you think using the Internet for classwork would be like? Is it what you expected? If different, different in what way?

3. Do you use Internet outside of school? If so, what do you use it for? What service do you use (AOL? Compuserve? Other?) Did you use it before you used it in school? In this class?

4. Tell me about how you learned to use Internet? (Where was it? When? Who helped you learn?)

B. Class work

1. If today's class is part of a larger project or unit, ask the student to tell you about the project/unit.

   a. Unit or project topic? Reason for studying the topic? What will be the final product? (A test, paper, visual or oral report? A web page or on-line publication? Something else?) Is the product to be seen by anyone beyond the teacher? Who decided to do this project/unit? Who decided what the final product would be?

   b. What is your responsibility in the project/unit? Are you working with other people? Who? Who is responsible for what? How did you decide who would do what?

2. If part of a larger piece of work, how does today's class work fit? Talk about what you did today. What did you use the Internet for? How did you find the information from the Internet or the person you communicated with? How did you learn how to do what you did? Who helps you when you have questions or get stuck? Who do you help?

3. If you couldn't use Internet, could you do this work? How would you do it? What would be different about the final product? What would change about how you work? What would be harder or easier?

4. How often do you get to go on line in class? How long do you get to stay on-line when you use Internet?

5. What are some things you like best about using the Net? What do you not like?

6. What would you like to be able to do on-line that you can't do now? Why can't you do that now? Will you be able to do it before the end of the year?

TEACHER DEBRIEFING INTERVIEW
(after each classroom observation)

_____Gather samples of student work and ask the questions that arose during your class observation.

_____ Review the lesson and unit plans and ask about ways, if any, in which the class activities diverged from them. Ask about how the lesson fits into the course curriculum.

_____ Ask the teacher to talk about how s/he planned for the role of the Internet in the class. How did s/he get the idea? What technical or other problems did s/he encounter and how were they solved?

_____ What equipment or resources does s/he feel other teachers need to have; what do other teachers need to understand or be able to do in order to emulate this lesson or unit?

_____ Ask the teacher to describe how s/he would teach the lesson's content or what students would do to learn the content if access to the Internet were not available.

_____ Ask the teacher to talk about ways s/he has changed instructional methods, assessment and expectations of students (pedagogy) as a consequence of Internet use in this lesson or unit.

_____ Ask the teacher to describe his/her perception of the advantages and drawbacks of using Internet in this lesson or unit.

_____Ask the teacher to talk about any differences she attributes to Internet use in students' learning in this lesson or unit. For example, are there differences in students' thinking and problem solving skills? communication skills? reading comprehension? mathematical skill? content knowledge? teamwork? independence? persistence? enthusiasm?

_____ Ask the teacher to talk about assessment. What evidence does s/he have of changes in student learning mentioned in the response to the previous question. How does she normally assess student learning? Has Internet use affected his/her assessment methods?

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APPENDIX E

INDICATORS OF ENGAGED LEARNING

Indicators of Engaged Learning

Vision of Learning	Responsible for learning	Learner involved in setting goals, choosing tasks, developing assessments and standards for the tasks; has big picture of learning and next steps in mind.
	Strategic	Learner actively develops repertoire of thinking learning strategies
	Energized by learning	Learner is not dependent on rewards from others; has a passion for learning
	Collaborative	Learner develops new ideas and understanding in conversations and work with others
Tasks	Authentic	Pertains to real world, may be addressed to personal interest
	Challenging	Difficult enough to be interesting but not totally frustrating, usually sustained
	Multidisciplinary	Involves integrating disciplines t solve problems and address issues
Assessment	Performance-based	Involving a performance or demonstration, usually for a real audience and useful purpose
	Generative	Assessments having meaning for learner, maybe produce information, product, service
		Assessment is part of instruction and vice versa; students learn during assessment
	Seamless and ongoing	Assessment is culture fair
	Equitable	
Instructional Model	Interactive	Teacher or technology program responsive to student needs, requests (e.g., menu driver)
	Generative	Instruction oriented to constructing meaning; providing meaningful activities experience
Learning Context	Collaborative	Instruction conceptualizes students as part of learning community, activities are collaborative
	Knowledge-building	Learning experiences set up to bring multiple perspective to solve problems such that each perspective contributes to shared understanding for all; goes beyond brainstorming.
	Empathetic	Learning environment and experiences set up for valuing diversity, multiple perspectives, strengths
Grouping	Heterogeneous	Small groups with persons from different ability levels and backgrounds
	Equitable	Small groups organized so that over time all students have challenging learning tasks
	Flexible	Different groups organized for different instructional purposes so each person is a member of different group; works with different people
Teacher Roles	Facilitator	Engages in negotiation, stimulates and monitors discussion and project work but does not control
	Guide	Helps students to construct their own meaning by modeling, mediating, explaining when needed, redirecting focus, providing options
	Co-learner co-investigator	Teacher considers self as learner, willing to take risks to explore areas outside his or her expertise; collaborates with other teachers and practicing professionals
Student Roles	Explorer	Students have opportunities to explore new ideas tools, push the envelope in ideas and research
	Cognitive Apprentice	Learning is situated in relationship with mentors who coaches students to develop ideas and skills that stimulate the role of practicing professionals (i.e., engage in real research)
	Teacher	Students encouraged to teach others in formal and informal contexts
	Producer	Students develop products of real use to themselves and others

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